

***FlyBy Math™* Alignment**
Mathematics Content Standards, Benchmarks and Performance Standards
June 2002

Strand: NUMBER AND OPERATIONS**Standard:** Students will understand numerical concepts and mathematical operations.**5-8 Benchmark: Compute fluently and make reasonable estimates.****Performance Standards: Grade 8**

6. Select and use appropriate forms of rational numbers to solve real-world problems including those involving proportional relationships.

***FlyBy Math™* Activities**

--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.

Strand: ALGEBRA**Standard:** Students will understand algebraic concepts and applications.**5-8 Benchmark: Understand patterns, relations, and functions.****Performance Standards: Grade 8**

1. Move between numerical, tabular, and graphical representations of linear relationships.

***FlyBy Math™* Activities**

--Represent distance, speed, and time relationships for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system.

2. Use variables to generalize patterns and information presented in tables, charts, and graphs:

- graph linear functions noting that the vertical change per unit of horizontal change (the slope of the graph) is always the same
- plot the values of quantities whose ratios are always the same, fit a line to the plot, and understand that the slope of the line equals the quantities

--Represent distance, speed, and time relationships for constant speed cases using linear equations and a Cartesian coordinate system.

--Interpret the slope of a line in the context of a distance-rate-time problem.

5-8 Benchmark: Represent and analyze mathematical situations and structures using algebraic symbols.**Performance Standards: Grade 8**

3. Evaluate formulas using substitution.

***FlyBy Math™* Activities**

--Use the distance-rate-time formula to predict and analyze aircraft conflicts.

5. Graph solution sets of linear equations in two variables on the coordinate plane.

--Use graphs to compare airspace scenarios for both the same and different starting conditions and the same and different constant (fixed) rates.

6. Formulate and solve problems involving simple linear relationships, find percents of a given number, variable situations, and unknown quantities.	--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.
7. Use symbols, variables, expressions, inequalities, equations, and simple systems of equations to represent problem situations that involve variables or unknown quantities.	--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.
5-8 Benchmark: Use mathematical models to represent and understand quantitative relationships.	
Performance Standards: Grade 8 1. Generate different representations to model a specific numerical relationship given one representation of data (e.g., a table, a graph, an equation, a verbal description)	<i>FlyBy Math™</i> Activities --Represent distance, speed, and time relationships for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system.
5-8 Benchmark: Analyze changes in various contexts.	
Performance Standards: Grade 8 1. Use graphs, tables, and algebraic representations to make predictions and solve problems that involve change.	<i>FlyBy Math™</i> Activities --Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes. --Use tables, graphs, and equations to solve aircraft conflict problems.
2. Estimate, find, and justify solutions to problems that involve change using tables, graphs, and algebraic expressions.	--Explain and justify solutions regarding the motion of two airplanes using the results of plotting points on a schematic of a jet route, on a vertical line graph, and on a Cartesian coordinate system. --Predict outcomes and explain results of mathematical models and experiments.
3. Use appropriate problem-solving strategies (e.g., drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table or graph, working a simpler problem, writing an algebraic expression or working backward) to solve problems that involve change.	--Use tables, graphs, and equations to solve aircraft conflict problems.
4. Solve multi-step problems that involve changes in rate, average speed, distance, and time.	--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios. --Interpret the slope of a line in the context of a distance-rate-time problem.
5. Analyze problems that involve change by identifying relationships, distinguishing relevant from irrelevant information, identifying missing	--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.

information, sequencing, and observing patterns.	
6. Generalize a pattern of change using algebra and show the relationship among the equation, graph, and table of values.	<p>--Represent distance, speed, and time relationships for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system.</p> <p>--Use tables, bar graphs, line graphs, equations, and a Cartesian coordinate system to draw conclusions.</p>
7. Recognize the same general pattern of change presented in different representations.	<p>--Represent distance, speed, and time relationships for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system.</p> <p>--Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.</p>

Strand: GEOMETRY

Standard: Students will understand geometric concepts and applications.

5-8 Benchmark: Specify locations and describe spatial relationships using coordinate geometry and other representational systems.

Performance Standards: Grade 8	<i>FlyBy Math™</i> Activities
1. Represent, formulate, and solve distance and geometry problems using the language and symbols of algebra and the coordinate plane and space (e.g., ordered triplets).	--Plot points on a schematic of a jet route, on a vertical line graph, and on a Cartesian coordinate system to describe the motion of two airplanes.

Strand: MEASUREMENT

Standard: Students will understand measurement systems and applications.

5-8 Benchmark: Apply appropriate techniques, tools, and formulas to determine measurements.

Performance Standards: Grade 8	<i>FlyBy Math™</i> Activities
1. Use ratios and proportions to measure hard-to-measure objects.	--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.
2. Use estimation to solve problems.	<p>--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.</p> <p>--Predict outcomes and explain results of mathematical models and experiments.</p>
7. Solve simple problems involving rates and derived measurements for such properties as velocity and density.	--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.

Strand: DATA ANALYSIS AND PROBABILITY

Standard: Students will understand how to formulate questions, analyze data, and determine probabilities.

5-8 Benchmark: Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

Performance Standards: Grade 8

3. Organize, analyze, and display appropriate quantitative and qualitative data to address specific questions including:

- frequency distributions
- plots
- histograms
- bar, line, and pie graphs
- diagram and pictorial displays
- charts and tables

***FlyBy Math™* Activities**

--Represent distance, speed, and time relationships for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system.

--Explain and justify solutions regarding the motion of two airplanes using the results of plotting points on a schematic of a jet route, on a vertical line graph, and on a Cartesian coordinate system.

5. Simulate an event selecting and using different models.

--Conduct simulation and measurement for several aircraft conflict problems.

5-8 Benchmark: Select and use appropriate statistical methods to analyze data.

Performance Standards: Grade 8

3. Analyze data to make decisions and to develop convincing arguments from data displayed in a variety of formats that include:

- plots
- distributions
- graphs
- scatter plots
- diagrams
- pictorial displays
- charts and tables
- Venn diagrams

***FlyBy Math™* Activities**

--Explain and justify solutions regarding the motion of two airplanes using the results of plotting points on a schematic of a jet route, on a vertical line graph, and on a Cartesian coordinate system.

4. Interpret and analyze data from graphical representations and draw simple conclusions (e.g., line of best fit).

--Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.

--Explain and justify solutions regarding the motion of two airplanes using the results of plotting points on a schematic of a jet route, on a vertical line graph, and on a Cartesian coordinate system.

5-8 Benchmark: Develop and evaluate inferences and predictions that are based on data.

Performance Standards: Grade 8

3. Conduct simple experiments and/or simulations, record results in charts, tables, or graphs, and use the results to draw conclusions and make predictions.

***FlyBy Math™* Activities**

--Conduct simulation and measurement for several aircraft conflict problems.

--Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.

--Use calculations and experimental evidence to predict, describe, and explain several aircraft conflict problems.

4. Compare expected results with experimental results and information used in predictions and inferences.

--Compare predictions, calculations, and experimental evidence for several aircraft conflict problems.